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UDP Focus: Soil superstar

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Mary Beth Kirkham, university distinguished professor of agronomy, studies soil, plant and water interactions to answer questions about environmental effects on plant growth.

Soil superstar

Professor's distinguished career keeps growing

By Taylor Provine

When Mary Beth Kirkham sees a problem, she turns to the soil for the answers.

The Kansas State University distinguished professor of agronomy studies interactions among soil, plants and water, which involves the movement of water from soil to plants out into the atmosphere. Her research has answered questions about how the environment affects plant growth.

Kirkham was the first researcher to study the effects of elevated carbon dioxide levels on crops grown under semiarid conditions, like those in Kansas.

"Carbon dioxide levels are naturally increasing in the environment each year," she said. "We want to see how this would affect plant growth in the future."

Kirkham and her students have monitored how much water is being lost from the plants through their stomata, which are the small holes in the leaves.

"One effect elevated carbon dioxide has on plants is it closes the stomata," Kirkham said. "The more the stomata are closed, there's less water loss in the plant."

Their research also shows that soil-water content is greater under elevated carbon dioxide levels.

"As the carbon dioxide concentration in the atmosphere increases, the water-use efficiency of crops also increases," she said. "Plants are going to be more drought resistant under elevated levels of carbon dioxide, which is extremely beneficial for semiarid regions."

Kirkham also studies the uptake of heavy metals by plants grown in highly polluted soil.

In her most recent study, Kirkham and a graduate student took a soil sample from an abandoned mining district in southeast Kansas and applied biosolids, or treated sewage sludge, which is known to improve plant growth.

"We found that the phosphorus in the sludge was preventing the uptake of the metals from the soil and the plants grew fine," Kirkham said. "The plants that grew without the sludge were stunted and showed serious heavy metal damage."

For degraded land, this could be a solution to remediate it and make it more productive, she said.

Kirkham joined the university in 1980. She has published three textbooks and contributed to more than 300 articles in scientific publications. She is a fellow of the American Society of Agronomy, the Soil Science Society of America, the American Association for the Advancement of Science, the Crop Science Society of America and the Royal Meteorological Society.

She has received several notable awards, including the Carl Sprengel Agronomic Research Award from the American Society of Agronomy, the 2010 Crop Science Research Award and the 2013 Irvin E. Youngberg Award in Applied Sciences, one of the Higuchi-University of Kansas Endowment Research Achievement Awards. k